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Survey summary report

Line-transect aerial survey, October – November 2025: Southeast Fisheries Science Center

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1. Abstract

The Southeast Fisheries Science Center conducted an aerial survey over the U.S. continental shelf waters of the Gulf of America (formerly the Gulf of Mexico; hereafter, the Gulf). The survey was conducted between October 6 and November 26, 2025, aboard a NOAA Twin Otter aircraft at an altitude of 600 feet and a speed of 100 knots over ground. Survey tracklines were oriented perpendicular to the shoreline and latitudinally spaced 20 km apart. The primary goal of this survey was to characterize the distribution and abundance of marine mammals and sea turtles in the Gulf and update the species distribution models. The survey was designed using distance sampling methods with an independent two-team approach to correct for perception bias in the resulting estimates. A total of 8,890.7 km of tracklines were surveyed on-effort and included 238 marine mammal sightings of four identified species. Eighty-six percent of all cetacean sightings were of common bottlenose dolphins. There were 131 sea turtle sightings, with loggerhead and Kemp's Ridley totaling 31% and 21% of all identified sightings, respectively.

2. Objectives

The goal of this project was to conduct a line-transect survey using the distance sampling approach to estimate abundance and update species distribution models of marine mammals, sea turtles, and large fish (manta rays and whale sharks) in U.S. waters over the continental shelf of the Gulf. This is the first of three aerial surveys scheduled to take place between 2025 and 2027. The products of this study will provide important information to inform the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) regulatory needs, as well as other consulting/cooperating agencies and interested stakeholders involved in management, conservation, and recovery of Gulf protected species. These data are crucial for understanding environmental variability at seasonal and inter-annual scales. Further, these products will aid management decision-making by building on foundational datasets and addressing information gaps and support statutory needs under the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), Endangered Species Act (ESA), and other relevant federal statutes (e.g., Oil Pollution Act, Magnuson-Stevens Act, National Marine Sanctuaries Act).

3. Survey period and area

This survey was conducted between October 6 and November 26, 2025. The proposed study area extended from the Florida Keys to Brownsville, Texas (Fig. 1).

4. Methods

The survey was conducted aboard a DeHavilland Twin Otter DHC-6 flying at a target altitude of 183 m (600 ft) above the water surface and a speed-over-ground of approximately 100 knots. Surveys were typically flown only when ceilings were above ~1,000 feet and wind speeds were less than 10-15 knots, or approximately sea state 4 or less on the Beaufort scale (*https://www.weather.gov/mfl/beaufort*). The survey was conducted along tracklines oriented perpendicular to the shoreline; the same configuration used in previous studies in the Gulf (Rappucci et al., 2019; Rappucci et al., 2021a, Rappucci et al., 2021b).

To conduct the survey, two pilots and two teams of three marine mammal observers each were onboard the aircraft (tail number N57RF). The forward team (Team 1) consisted of two observers stationed in bubble windows on the left and right side of the airplane and an associated data recorder. The aft team (Team 2) consisted of a belly observer looking straight down through a belly port window, one observer in the right-side bubble window, and a dedicated data recorder (Fig. 2). The bubble windows allowed downward visibility from approximately 0 degrees in relation to the trackline to 60 degrees upward. The belly observer could see approximately 35 degrees on either side of the trackline. During on effort periods, that is when the plane was flying level over tracklines and at survey altitude and speed, observers searched from the trackline (0˚) to approximately 60˚ above vertical. The belly observer reported the interval for the sighting based on markings on the belly window (1 to 4 and left or right) (Fig. 3). Both teams operated on independent intercom channels so that they were not able to cue one another to sightings, therefore implementing the independent observer approach to correct for visibility bias (Laake and Borchers 2004). Data were recorded by each team on a laptop computer running a data acquisition software ("VisSurvey"), which outputs a Microsoft Access database. A handheld Global Positioning System (GPS) connected to external antennas inputted location roughly every 10 seconds. Data recorders entered environmental conditions assessed by the observers (e.g., sea state, glare, sun penetration, visibility, etc.) and effort information for each team. When a sea turtle, marine mammal, or other organism was observed, the observer waited until it was perpendicular to the aircraft and measured the angle to the organism (or the center of the group) using a digital inclinometer. Once both teams had the opportunity to detect the sighting, the aircraft departed from the trackline and circled over marine mammal sightings as needed to confirm species identification, count group size, and take photographs as needed. After completing a marine mammal sighting, data recorders entered species, group size and which team had detected the sighting (forward only, aft only or both) in their respective databases. Sea turtle and other sightings were recorded separately by each team. Once back from the survey, data were audited based on error logs maintained by observers and other protocols (Appendix).

5. Results

The lapse in appropriations ("government shut down") delayed the start of the survey by five days. On Oct. 6th, personnel travelled to St. Petersburg, FL. Multiple survey flights were lost due to unfavorable weather conditions (high winds, storms, low ceilings), leaving the central-south coast of FL unsurveyed. Additional survey days were lost due to mechanical problems with the plane in which the right engine starter failed.

In total, 17 days were conducive to surveying allowing for 26 flights and approximately 97 hours of flying time. A total of 8,890.7 km of effort were performed. The average sea state while on-effort during the survey was 2.8 on the Beaufort scale (Table 1).

A total of 238 marine mammal sightings including 1,576 animals were recorded (Table 2, Fig. 4). The primary species observed was the common bottlenose dolphin (*Tursiops truncatus*) with 204 sightings and 1,284 animals widely distributed throughout the study area. During a transit from one trackline to another, a Rice's whale (*Balaenopteta ricei*) was seen and photographed

(Fig. 5). There were 130 sightings of sea turtles with 137 animals (Table 3, Fig. 6). Loggerhead turtles (*Caretta caretta*) were the most commonly identified species with 41 sightings, followed by Kemp's ridley (*Lepidochelys kempii*), with 26. Unidentified hardshells accounted for 42% of all turtle sightings. Fish sightings included primarily sharks but a high number of manta rays were also seen, especially off LA (Table 4, Figs. 7 and 8).

6. Data

This report presents preliminary summary data that could change as further auditing and analysis occur.

All data collected during this survey are archived and managed at the Southeast Fisheries Science Center (SEFSC) in Miami, FL. The complete data set will be archived and publicly available at the National Centers for Environmental Information (*https://www.ncei.noaa.gov/*). In addition, density map products will be distributed on the OBIS-SEAMAP density mapper (*https://seamap.env.duke.edu/models/Duke/GOM/*) platform.

7. Permit

The SEFSC was authorized to conduct marine mammal research activities during the survey under Marine Mammal Protection Act and Endangered Species Act (MMPA/ESA) Permit No. 27867.

8. Acknowledgments

The funds for this project were provided by the Bureau of Ocean Energy Management (BOEM). NOAA Fisheries' Southeast Fisheries Science Center and the NOAA Aircraft Operations Center covered staff time. This research was carried out, in part, as a cooperative agreement (NA25OARX432C0018-T1-01) between the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) at the University of Miami and the National Oceanic and Atmospheric Administration. We would like to thank the pilots, Josh Rannenberg and Martial Ngangnang (Oct. 6th-Nov. 1st), Max Anderson and Dylan Legus-Sleigh (Nov. 2nd-26th) and observers (Heidi Malizia, Corey Accardo, LT Emily Ruhl, Lisa Belskis, Richard Holt, Rachel Hardee, Mary Applegate and Nick Metheny) who participated in this survey.

9. References

Laake, J.L. and Borchers, D.L. 2004. Methods for incomplete detection at distance zero. In: Advanced Distance Sampling. Buckland, S.T., Anderson, D.R., Burnham, K.P., Laake, J.L., and Thomas, L. (eds.). Oxford University Press, 411 pp.

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Fisheries Science Center. *https://www.boem.gov/sites/default/files/documents/renewable-energy/20210120_GoMMAPPS_Aerial_2018W_SummaryReport_updated.pdf*

Rappucci, G.; Barry, K.; Foster, M.; Litz, J.; Garrison, L.P. 2021b. GoMMAPPS Fall aerial abundance survey during October – November 2018: Summary Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center. *https://www.boem.gov/sites/default/files/documents/renewable-energy/20210119_GoMMAPPS_Aerial_2018F_SummaryReport_updated.pdf*

10.Tables

Table 1: Daily summary of effort, sea state and mammal and sea turtle sightings during the aerial survey fall 2025.

Date	Activity	Ave. SS	Number of MM sights.	Number of ST sights.	km of effort
10/1	gov shutdown - delayed	NA	NA	NA	NA
10/2	gov shutdown - delayed	NA	NA	NA	NA
10/3	gov shutdown - delayed	NA	NA	NA	NA
10/4	gov shutdown - delayed	NA	NA	NA	NA
10/5	gov shutdown - delayed	NA	NA	NA	NA
10/6	travel day (St. Petersburg, FL)	NA	NA	NA	NA
10/7	weather	NA	NA	NA	NA
10/8	weather	NA	NA	NA	NA
10/9	weather	NA	NA	NA	NA
10/10	weather	NA	NA	NA	NA
10/11	weather	NA	NA	NA	NA
10/12	mechanical problem; transit (to AOC)	NA	NA	NA	NA
10/13	mechanical problem	NA	NA	NA	NA
10/14	survey	2.8	14	16	762.2
10/15	survey, reposition to Panama City, FL	3.0	9	14	508.6
10/16	survey	2.0	14	22	698.9
10/17	weather	NA	NA	NA	NA
10/18	weather	NA	NA	NA	NA
10/19	weather	NA	NA	NA	NA
10/20	survey, reposition to Gulf Shores, AL	3.3	5	3	177.7
10/21	survey	2.2	20	25	726.3
10/22	weather	NA	NA	NA	NA
10/23	weather	NA	NA	NA	NA
10/24	weather	NA	NA	NA	NA
10/25	weather	NA	NA	NA	NA
10/26	weather	NA	NA	NA	NA
10/27	survey, reposition to Lafayette, LA	3.1	18	3	532.2
10/28	survey	2.6	19	8	772.2
10/29	weather	NA	NA	NA	NA
10/30	weather	NA	NA	NA	NA
10/31	survey	2.6	26	5	1019.7
11/1	survey	4.8	0	0	75.5
11/2	weather	NA	NA	NA	NA
11/3	weather	NA	NA	NA	NA
11/4	survey	3.1	10	3	399.5
11/5	survey	3.1	18	8	833.3

11/6	reposition to Elington, TX	NA	NA	NA	NA
11/7	weather	NA	NA	NA	NA
11/8	survey	3.5	19	1	374.9
11/9	weather	NA	NA	NA	NA
11/10	weather	NA	NA	NA	NA
11/11	survey, transit (to AOC)	3.9	5	0	319.4
11/12	Plane at AOC (100th-hour maintenance)	NA	NA	NA	NA
11/13	Plane at AOC (100th-hour maintenance)	NA	NA	NA	NA
11/14	Plane at AOC (100th-hour maintenance)	NA	NA	NA	NA
11/15	transit (from AOC)	NA	NA	NA	NA
11/16	mechanical problem, survey	3.0	20	3	524.1
11/17	reposition to Corpus Christi, TX	3.6	0	0	28.3
11/18	survey	4.0	5	1	188.4
11/19	weather	NA	NA	NA	NA
11/20	weather	NA	NA	NA	NA
11/21	weather	NA	NA	NA	NA
11/22	mechanical problem, survey	2.0	6	5	187.1
11/23	weather	NA	NA	NA	NA
11/24	weather	NA	NA	NA	NA
11/25	survey	2.3	30	14	762.1
11/26	travel day	NA	NA	NA	NA
Totals		**2.8**	**238**	**130**	**8890.7**

Table 2: Summary of marine mammal sightings during aerial survey fall 2025.

Species	**Num. sightings**	**Num. animals**
Atlantic spotted dolphin	4	106
Common bottlenose dolphin	204	1284
Common bottlenose or Atlantic spotted dolphin	13	99
Rice's whale	1	1
Stenellid dolphin	4	55
Unidentified dolphin	9	27
Unidentified odontocete	1	1
Unidentified small whale	1	1
West Indian manatee	1	2
Totals	**238**	**1576**

Table 3: Summary of sea turtle sightings during aerial survey fall 2025. Team 1 only.

Species	Num. sightings	Num. animals
Green Turtle	6	6
Hardshell	54	60
Kemp's Ridley	26	27
Leatherback	3	3
Loggerhead	41	41
Totals	**130**	**137**

Table 4: Summary of fish sightings during aerial survey fall 2025. Team 1 only.

Species	Num. sightings	Num. animals
Cownose Ray	2	17
Hammerhead Shark	44	45
Manta Ray	31	82
Sicklefin devil ray	1	1
Spinetail devil ray	1	1
Unidentified Ray	8	15
Unidentified Shark	163	263
Totals	**250**	**424**

11. Figures

Figure 1: Proposed tracklines for the survey Fall 2025

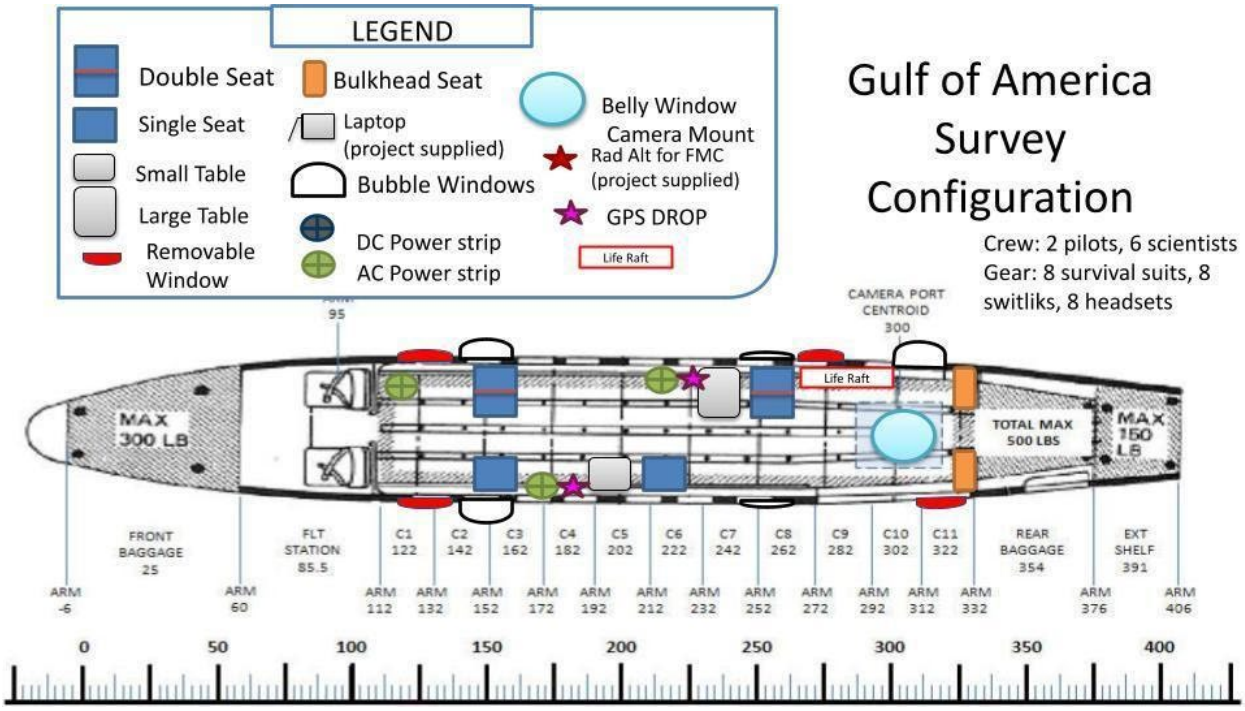

Figure 2: Twin Otter configuration for the fall 2025 survey

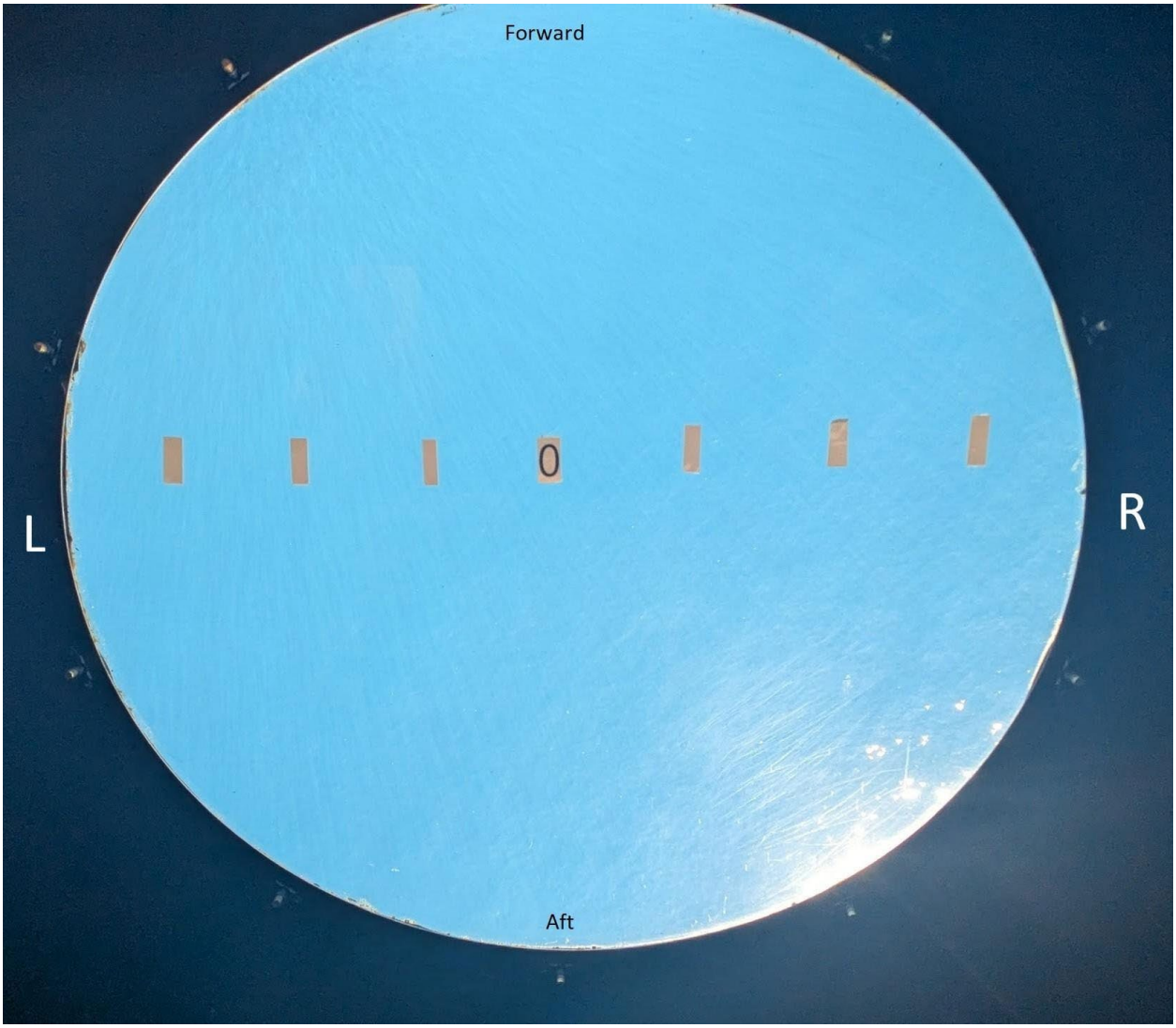

Figure 3: Belly port markings

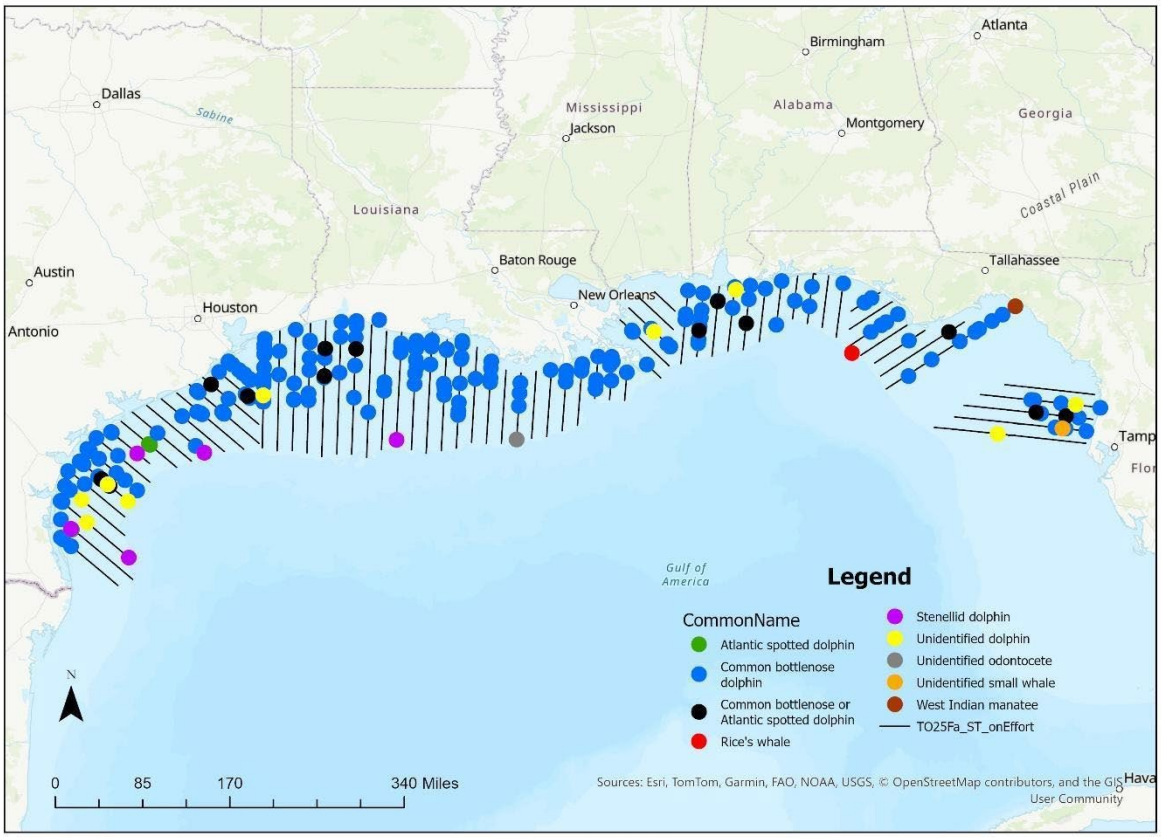

Figure 4: Marine mammal sightings

Figure 5: Rice's whale photographed during the survey

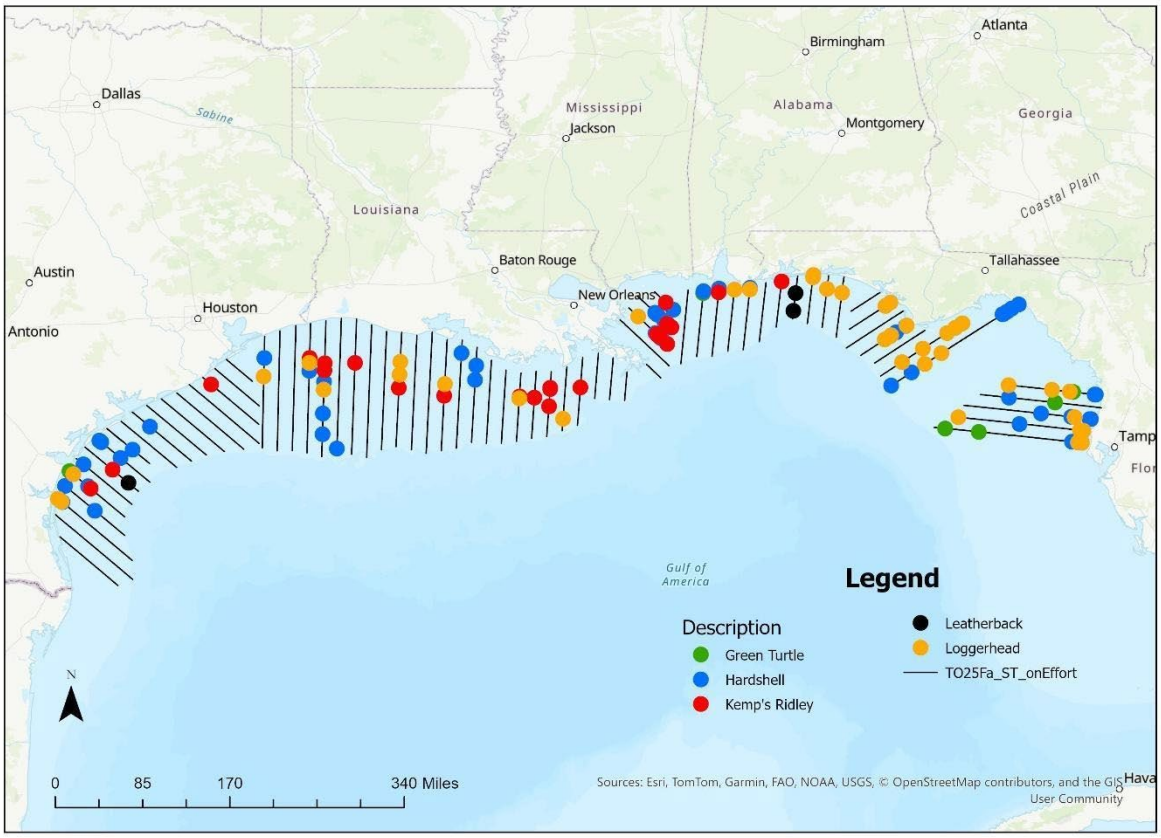

Figure 6: Sea turtle sightings

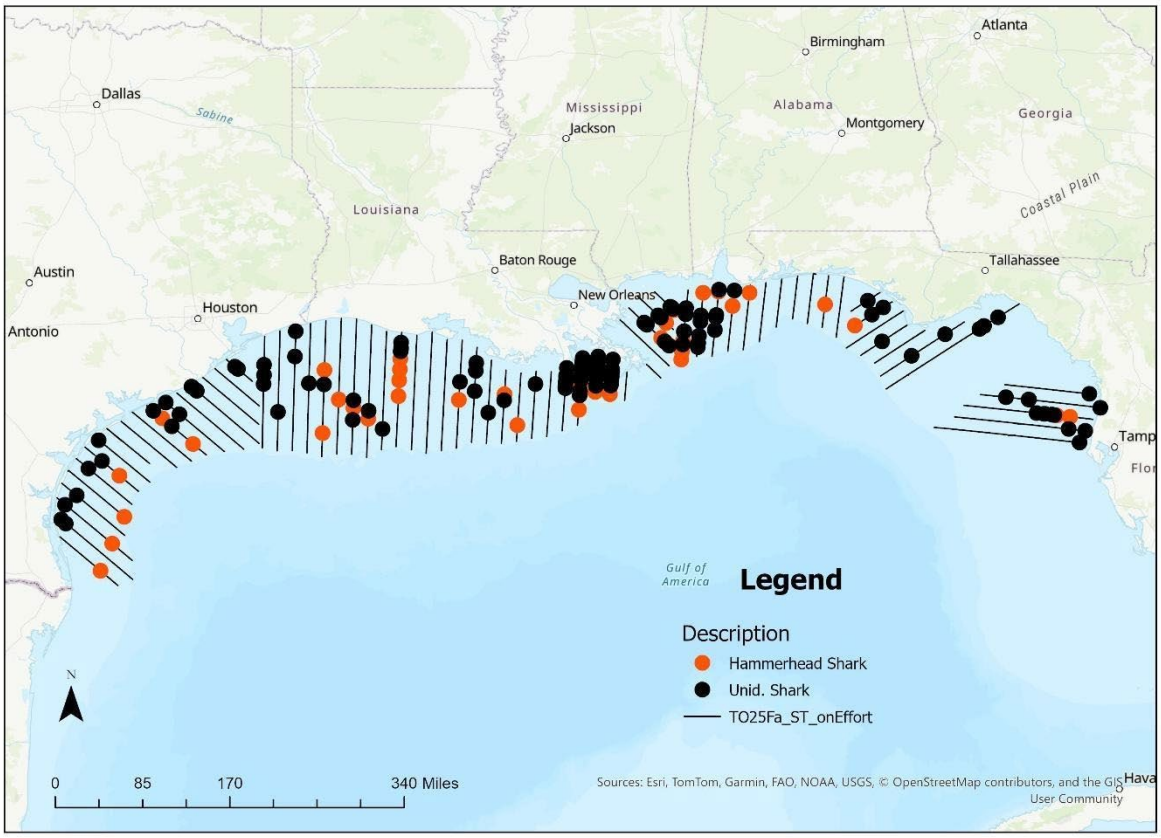

Figure 7: Shark sightings. Unid. = unidentified.

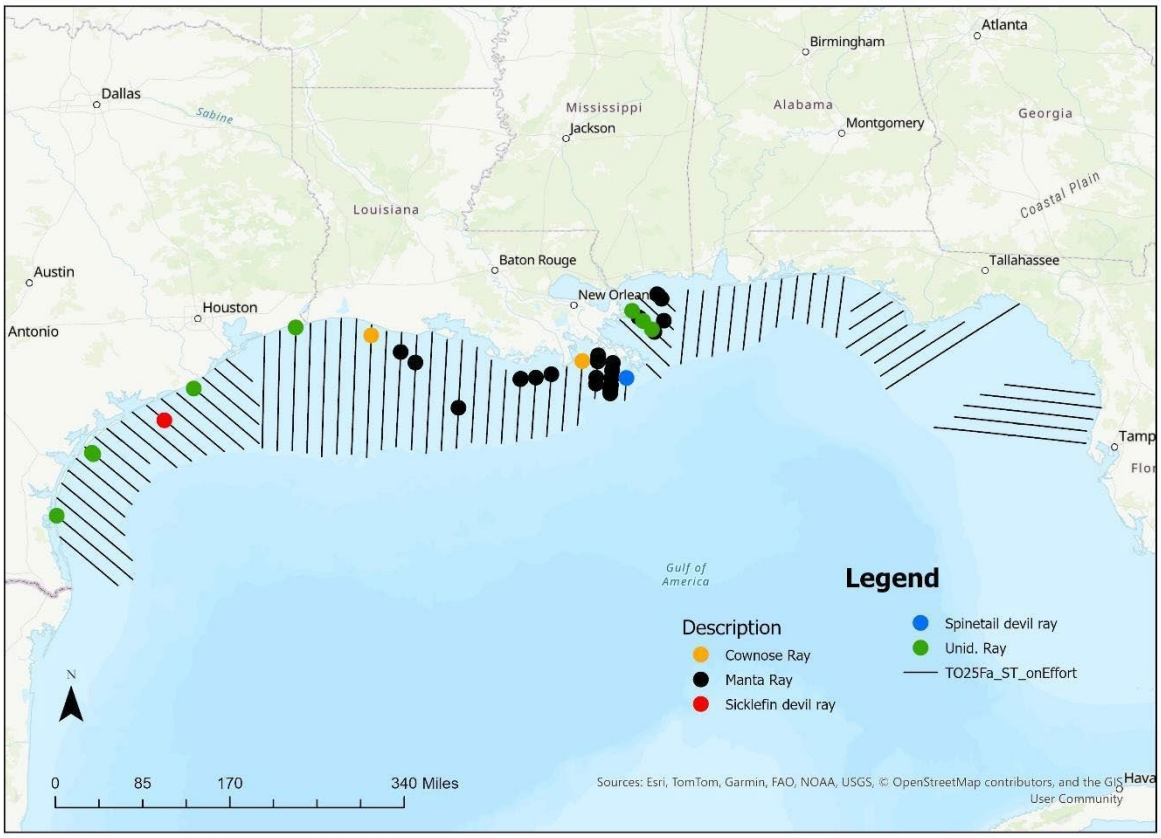

Figure 8: Rays sightings. Unid. = unidentified.

12. Appendix: Aerial survey data auditing

Merge team 2 – Aft (T2) to team 1 – Forward (T1) database tables and save as "Project_TOYYSs_YYYYMMDD.mdb".

Add prefixes to tables by team: Sightings_T1_FOR, Sightings_T2_AFT and so on.

Error log tables:
Review errors/notes and address each by adding corrections/notes in the "Edits_Initials" column. If no correction is needed, write "None".

Survey track tables:
No test points

Circle points off effort

Transit points off effort

Numeric trackline numbers; transit = 0 (only transit to/from airport; not between lines)

Unique trackline number per day (add "1" to line surveyed 2x)

On effort points with backfilled environs (as needed)

Observers assigned per team (FOR: L, R and recorder; AFT: R, belly, recorder), while on effort - unless stated otherwise

No unoccupied position during effort (unless stated otherwise)

All points within survey area

No 0 coordinates

Speed: 0 - ~ 200 knots

Heading: 0 - 359.9 true bearing

Sightings tables:
No test entries

No 0 coordinates and time

Species code numeric (if not)

Species match sighting forms

Group sizes match sighting forms

Same number of sightings between T1 and T2 (unless stated otherwise)

Effort matches sighting forms

Team matches sighting forms

Sighting positions (1=L, 2=R, 4=L+B, 5=R+B) have angle data; if not, leave blank

Sighting positions (3=B, 4=L+B, 5=R+B) have belly increment data; if not, leave blank

Sighting positions (6=other crew, 7=missed) have obs = 99 and off effort

Non-mammal sightings tables:
No test entries

No 0 coordinates and time

Sighting positions (1=L, 2=R, 4=L+B, 5=R+B) have angle data; if not, leave blank

Sighting positions (3=B, 4=L+B, 5=R+B) have belly increment data; if not, leave blank

Sighting positions (6=other crew, 7=missed) have obs = 99 and off effort

Remove entry temperature column

Number and EstNumber align (0=unknown, 1=less than 10, 2=10-50, 3=50-100, 4=100-500, 5=more than 500); disregard EstNum 0 if Number is populated

Sighting marks tables:
No test entries

Make sure links between marks and sightings and non-MM align by: close location and time, same sight angle (unless stated otherwise); log changes in the error log

Type (0=mammal, 1=turtle, 2=other) align with mammal or non-MM sighting

Pos (0=L, 1=R, 2=B) align with sighting positions (above); if not, unlink mark from sighting and note on the error log